

## Effect of Slope Angle on Gougerd Landslide Stability in Northwest of Iran

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**Abstract :** Gougerd village landslide with area about 150 hectares is located in southwest of Khoy city in northwest of the Iran. This Landslide was commenced more than 21 years and caused some damages in houses like some fissures on walls and some cracks on ground and foundations. The main mechanism of landslide is rotational with the high different of top and foot is about 230 m. The thickness of slide mass based on geoelectrical investigation is about 16m obtained. The upper layer of slope is silty sand and the lower layer of clayey gravel. In this paper, the stability of landslide are analyzed based in static analysis under different groundwater surface conditions and at slope angle changes with limit equilibrium method and the simplified Bishop method. The results of the 72 stability analysis showed that the slope stability of Gougerd landslide increased with increasing of the groundwater surface depth of slope crown. And especially when decreased of slope angle, the safety factor more than in previous state is increased. The required of safety factor for stability in groundwater surface depth from slope crown equal 14 m and with decreased of slope angle to 3 degree at decrease of groundwater surface depth from slope crown equal 6.5 m obtained. The safety factor in critical conditions under groundwater surface depth from slope crown equal 3.5 m and at decreased of slope angle to 3 degree equal 0.5 m obtained. At groundwater surface depth from slope crown of 3 m, 7 m and 10 m respectively equal to 0.97, 1.19 and 1.33 obtained. At groundwater surface depth from slope crown of 3 m, 7 m and 10 m with decreased of slope angle to 3 degree, respectively equal to 1.27, 1.54 and 1.72 obtained. According to the results of this study, for 1 m of groundwater level decrease, the safety factor increased by 5%, and for 1 degree of reduction of the slope angle, safety factor increased by 15%. And the effect of slope angle on Gougerd landslide stability was felt more than groundwater effect.

**Keywords :** Gougerd landslide, stability analysis, slope angle, groundwater, Khoy

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